

**TACTICAL ASSAULT LIGHT OPERATOR SUIT (TALOS) APPENDIX C.1  
TO  
BROAD AGENCY ANNOUNCEMENT  
USSOCOM-BAAST-2015**

**1.0 Introduction:** Tactical Assault Light Operator Suit (TALOS) is an overarching vision to drastically improve the ground operator's survivability and capability. The vision provides a coordinating focus for many of USSOCOM's Science and Technology (S&T) efforts spanning multiple capability areas and technology maturity levels. The capability areas include enhanced warfighter protection, improved situational awareness, increased mobility, advancements in battlefield power generation and storage, and modernized ground force communication and control. Each capability is approached holistically to ensure system-level operational effectiveness for the ground operator. The team is currently focused on delivering a fully functional prototype assault suit by August 2018.

**2.0 Organization:** JATF-TALOS.

**3.0 USSOCOM-BAAST-2015 Appendix C.1 TALOS Points of Contact (POC):**

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**4.0 Technology Areas of Interest:**

USSOCOM is interested in receiving white papers from all responsible sources from industry, academia, individuals, and Government organizations capable of providing the design, development, and testing of TALOS-related technologies. The intent is to accelerate the delivery of innovative TALOS capabilities to the Special Operations Forces (SOF) warfighter. Technology may include, but are not limited to:

**4.1 Survivability:**

USSOCOM seeks to design and develop materials, devices, systems, and/or structures to support next generation ballistic, blast, and operator protection. The technology should minimize weight and bulk while providing protection against, at a minimum, advanced rifle rounds. The ability to rapidly obtain National Institute of Justice (NIJ) certified ballistic test results on small samples of new armor materials is desired. Small area (less than 50 square inches), moderately curved, thin, and lightweight transparent armor materials with advanced round protection are required. Also highly desired are:

**4.1.1** Design configurations that afford maximum rigid material coverage over the human body, including the dynamic/junctional regions.

**4.1.2** Technologies that provides revolutionary ballistic protection against a range of rifle threats.

**4.1.3** Technologies that aid in concealment from the observation of the enemy.

**4.1.4** Technology that provides countermeasures to a variety of operator threats to ensure advanced protection in all environments.

**4.1.5** Technologies to reduce the electromagnetic and acoustic signature.

**4.1.6** Technologies that assist with mounting ballistic material and other subsystems to dynamic structural components.

**4.2 Mobility/Agility:**

USSOCOM seeks to develop unique exoskeletons systems to augment human strength, endurance, and mobility while carrying an increased combat load in a dynamic movement environment. USSOCOM is seeking technologies to address the following Exoskeleton subsystems:

**4.2.1** Structure – Load-bearing subsystem including but not limited to structural braces and joint design, mount points, and human-machine interfaces (e.g. soft-goods, etc.).

**4.2.2** Actuation – Mechatronic subsystem, including but not limited to prime movers, transmissions, and actuator control.

**4.2.3** Sensor and Control Hardware – Computation and Sensor subsystem, including but not limited to central processing, proprioception sensors, and real-time control networks.

**4.2.4** Sensor and Control Software – Control Algorithm subsystem, including but not limited to state estimation, motion prediction, and high level control.

**4.3 Operator Interface, Visual Augmentation System, Situational Awareness and Targeting:**

USSOCOM seeks to develop Technology that ensures the TALOS operator is fully aware of his environment with enhanced situational awareness presented via multiple senses including next generation displays.

**4.3.1** Technologies capable of maximizing situational awareness via visual, auditory, and tactile sensory input.

**4.3.2** Technologies capable of capturing sound in 360 degrees and recreating digitally in both azimuth and elevation.

**4.3.3** Technologies supporting the ability to have 360 degree visual field of view in both azimuth and elevation.

**4.3.4** Technologies supporting informational display or see-through stereoscopic heads up displays and micro opaque displays. Specific areas of interest include:

- 4.3.4.1 Narrow-wavelength near-eye projection displays
- 4.3.4.2 Low optical distortion, transparent near-eye display capability
- 4.3.4.3 See-through fields of view in excess of 100° horizontal

**4.3.5** Technologies supporting control system interfaces for display operation not requiring physical manipulation.

**4.3.6** Technologies capable of displaying multi-spectral imagery on a see-through display.

**4.3.7** Technologies enabling a purely digital electro-optics system with minimal to zero latency.

**4.3.8** Technologies augmenting target acquisition to shorten the decision chain. Special areas of interest include, but are not limited to:

- 4.3.8.1 Virtual reticle capability
- 4.3.8.2 Capabilities to rapidly aim a weapon system without emitting illumination or requiring the operator to directly view weapon-mounted sighting systems
- 4.3.8.3 Systems which enable visualization of projectile flight path

#### **4.4 Command, Control, Communications & Intelligence (C3I)**

USSOCOM seeks to develop C3I Technology to implement a robust, ultra-wideband communication capability. The capabilities of the TALOS suit dictate the C3I infrastructure provide a very high-bandwidth solution both intra-team and beyond line of sight. The overall C3I solution must be modular, able to support a previously defined interface, and support multiple different vendor capabilities that will allow for continuous upgrade throughout the life of the equipment.

**4.4.1** Technology capable of utilizing advanced waveforms, both custom and commercial.

**4.4.2** Technology supporting over the horizon communication in a small form factor.

**4.4.3** Technology supporting high bandwidth over the horizon communication in contested environments.

**4.4.4** Technology supporting an open architecture that allows for portability of waveforms and WB/UWB communication.

**4.4.5** Technology that will support high bandwidth systems to increase overall situational awareness.

**4.4.6** Technology supporting a secure, small form factor, in-ear headset solution.

**4.4.7** Technology that will provide Position Location Information PLI via LPI/LPD advanced waveforms.

#### **4.5 Computers**

USSOCOM seeks to develop a computing platform for TALOS integrating multiple hardware architectures to allow for integrated and distributed processing of real time and non-real time information. The computing platform must be modular to allow for quick adoption of new Technology as they emerge from the commercial sector. The overall solution must provide the best of current and future Technology to support and act as the central processing solution for all of TALOS' complex integrated systems.

**4.5.1** Technology supporting wearable, semi to fully ruggedized high speed computing.

**4.5.2** Technology supporting an open architecture that allows the adaption and integration of separate system technologies.

**4.5.3** Technology that allows for modular components to be upgraded as technology advances.

**4.5.4** Technology that supports virtualization of both hard and software to include mainstream operating systems, as well as real time control operating systems.

**4.5.5** All computing technology shall be capable of supporting failover, i.e., soft and hard hand off, to secondary systems.

**4.5.6** Technology that is capable of supporting multiple hardware architectures either directly on board or through expansion ports, i.e., daughterboard/co-processing.

**4.5.7** Computing Technology shall be co-located on board and also capable of being physically distributed while utilizing high speed bus interconnectivity.

#### **4.6 Power and Energy**

USSOCOM seeks to develop power and energy technology including power generation, power management/monitoring, and energy storage. These technologies are necessary to provide an uninterrupted source of power to an untethered operator. Power will be used to support the system needs with the exoskeleton being the largest power consumer.

**4.6.1** Technologies that provide quiet, man portable (small backpack sized), fuel efficient power capable of providing up to several kW of clean DC power for multiple hours. Short term load peaks above this level are to be expected.

**4.6.2** Technologies of interest include but are not limited to internal combustion engine/generator, batteries, capacitors, fuel cells, or hybrid combinations.

**4.6.3** Technologies pertaining to the control power distribution to TALOS subsystems at multiple voltages.

**4.6.4** Technologies pertaining to thermal management, vibration mitigation and acoustic signature management

#### **4.7 Human Factors**

USSOCOM seeks to develop technology that focuses on a variety of man-machine pairing aspects. Novel means of bio-mechanical modeling and simulation (including measurement techniques) will be necessary. Human performance optimization shall be achieved by utilizing and integrating novel Technology for thermal management, increased human/machine pairing efficiencies, and methods to measure and triage the operator's physical and cognitive state.

**4.7.1** Technologies that address the physical and cognitive aspects of the operator.

**4.7.2** Technologies to manage heat to reduce the soldiers' metabolic rate and prolong endurance (thermal management applications).

**4.7.3** Technologies for helmet integrated cooling systems – technology for perspiration management and moisture control of the head.

**4.7.4** Next generation fabric materials for passive thermal management.

**4.7.5** Technologies for integrating sensors and bio capabilities into base layer fabrics.

**4.7.6** Embedded monitoring, oxygen systems, wound stasis, electromechanical compensation.

**4.7.7** Advanced helmet padding systems for impact, blast, and ballistic protection.

**4.7.8** Technologies that provide real-time physiological and medical monitoring.

**4.7.9** Suit integrated/remotely deployable advanced medical intervention devices (e.g., tourniquets, auto injectors).

**4.7.10** Biomechanical modeling and simulation tools for increased movement characteristics; informed design considerations.

**4.7.11** Technologies leading to methods of biomechanical motion capture and kinematics.

#### **5.0 Submission Instructions for Appendix C.1 - Tactical Assault Light Operator Suit (TALOS) Appendix to Broad Agency Announcement USSOCOM-BAAST-2015**

**5.1 Technology Development Cost and Schedule:** Offerors are advised to consider a limit of not more than \$3 million total cost of development and not more than 18 months

to complete all efforts for each submission under TALOS Appendix C.1. Offerors may exceed this amount, but they may or may not be considered for award due to cost and schedule constraints and/or other statutory or regulatory requirements.

**5.2 White Paper Submission and Review Periods:** The Appendix C.1 TALOS BAA Appendix was advertised through FedBizOpps on December 18, 2015, and will close or be updated prior to December 17, 2016. USSOCOM JATF-TALOS intends to conduct scientific and peer reviews on a quarterly review cycle. At the end of each quarterly review, USSOCOM will notify Offerors whether their white papers were selected for submission of a proposal. For planning purposes, a notional white paper evaluation schedule is provided. Future changes to this notional schedule may not be published and are at the sole discretion of the Government.

**5.2.1 Notional Evaluation Period 1** - White papers submitted from December 18 to February 1, 2016 will be evaluated from February 2, 2016 – March 18, 2016, with Offerors being contacted regarding the scientific peer review results of their white papers in April 2016.

**5.2.2 Notional Evaluation Period 2** - White papers submitted February 2, 2016 – May 1, 2016 will be evaluated May 4 - June 19, 2016, with Offerors being contacted regarding the scientific peer review results of their white papers in July 2016.

**5.2.3 Notional Evaluation Period 3** - White papers submitted May 2, 2016 – August 28, 2016 will be evaluated September 1 - October 20, 2016, with Offerors being contacted regarding the scientific peer review results of their white papers in November 2016.

**5.2.4 Notional Evaluation Period 4** - White papers submitted August 29, 2016 – December 16, 2016 will be evaluated December 17, 2016 – February 6, 2017, with Offerors being contacted regarding the scientific peer review results of their white papers in February 2017.

### **5.3 Criteria, Relative Importance, and Method for Selecting Proposals for Award:**

**5.3.1. Review Method:** The Government will review each white paper and select the Offerors that have the greatest potential to meet the needs of USSOCOM technology requirements based on the areas stated in USSOCOM-BAAST-2015 TALOS Appendix C. Initially, a determination will be made if each Offeror is technically qualified and has a comprehensive understanding to undertake the development of the technology based on the information stated in the white paper. The Government will determine the most technically competent and capable of the qualified Offerors using the criteria below.

**5.3.2. Review Criteria:** The Government will review the Offeror's capability to meet the technology requirements using the following specific criteria listed in descending order of importance:

**5.3.2.1. Relevance:** The Government will review the Offeror's description of the

technology and the USSOCOM unique technology need that it meets for the technical challenges listed in paragraphs 4.0 - 4.7 of this USSOCOM-BAAST-2015 TALOS Appendix C.1. The Offeror's facilities and equipment will be reviewed to assess its capability to conduct complete development of the technology, construction of a prototype or prototypes, and proof testing to assure maturity readiness.

**5.2.2.2. Innovative or Revolutionary Technology:** The Government will assess the Offeror's capability to satisfy the technical challenges and design objectives by reviewing the Offeror's unique, innovative, or revolutionary approach; technical risk and mitigation plan; the ability to achieve technology maturity; and other technical data/information conveyed.

**5.2.2.3. Price/Cost:** The Government will make a determination of the fairness and reasonableness for the proposed price/cost. The Offeror will be assessed whether the technology development can be successfully completed from the costs stated by the Offeror.

**5.2.2.4. Schedule:** The Offeror's schedule will be evaluated based on the reasonable level of effort and complexity of the technology; the resources, facilities, and equipment available; and the allocation of time per major task.

**5.3.3. Notification of Selection:** All Offerors submitting white papers will be contacted by the Government, either with written correspondence informing them that the effort proposed is not of interest to the Government, or with a request for a formal cost and technical proposal by a specified date.

**5.4 Document Submissions - General:** All Offeror documents, to include white papers, technical proposals, statements of work, and cost proposals, shall be submitted in electronic format. Offerors may submit their documents in Microsoft Word, Excel, or Adobe Acrobat. Quad charts or briefing presentations may be submitted in Microsoft Power Point. All Offeror's submitting white papers shall complete requisite data fields for USSOCOM-BAAST-15-TALOS at the following URL:  
<http://www.socom.mil/sordac/Pages/BAAHome.aspx>.

If you experience problems uploading attachments, you are still required to complete requisite data fields and then email attachments to TALOS@socom.mil. Subject line of email should state, "**White Paper-Topic Area –TALOSBAA16-Company Name.**" Upon notification of white paper selection, Offerors have 30 calendar days to prepare and submit a proposal in accordance with the format and instructions in Appendix B of USSOCOM-BAAST-2015.